



February 18, 2005

Mr. Andrew Fisk
Bureau of Land and Water Resources
Maine Department of Environmental Protection
17 State House Station
Augusta, ME 04333
Dear Mr. Fisk,

I am Dr. Curtis C. Bohlen, presently a restoration ecologist with Trout Unlimited, and an independent environmental consultant. I am writing to provide comments on the Draft TMDL for Gulf Island Pond. I want to begin by stating that I am impressed by the professionalism and the level of effort shown in undertaking the modeling required carrying out the TMDL analysis and to commend you and your staff on your hard work.

Issue 1: The TMDL is unnecessarily difficult to understand.

Public participation is an important part of any TMDL and to the permitting processes that depend upon it. In the long run the credibility the regulatory process rests on its transparency and on the ability of citizens and interested parties to understand how regulatory decisions were made. Whenever regulatory decisions rest on complex technical analyses, as they inevitably will on the Androscoggin, it is difficult to ensure that the technical basis of regulation can be understood by lay audiences. However, the Gulf Island Pond TMDL is unnecessarily difficult to follow.

- Key assumptions, methods and results are not described in the text, requiring diligent readers to track down earlier modeling and data reports to understand the logic of the TMDL.

Critical steps in the analysis must be explained with sufficient clarity so that the structure of the analysis can be understood without reference to other documents.

- Calculations are not described in sufficient detail to allow readers to understand how the numbers were derived.

All calculations and analyses (excluding those part of the formal model run which are described in other technical sources) should be described with sufficient clarity so that an informed professional can reproduce them.

- Data tables are often difficult to interpret

Table legends and headings for columns in tables should be edited for clarity and consistency and relationship to phrases used in the text.

- Terms and acronyms are often used in non-standard or confusing ways.

A glossary and a table of acronyms should be added.

The modeling effort undertaken by DEP is complex enough to act as a barrier to public participation on its own. The lack of clarity of the TMDL report itself simply exacerbates the situation. The effect is to make the TMDL process on Gulf Island Pond

impenetrable all but environmental professionals who can put considerable time into understanding the documents. Such professionals tend to be those who are being paid to provide such analysis, often for the dischargers on the Androscoggin. If DEP wants or expects significant, useful public participation from others, communication of the basis of the TMDL must be significantly improved. DEP should hire a professional technical writer to improve the clarity of the TMDL and to produce a simplified explanation of the analysis for a lay audience.

Issue 2: Disappearing Phosphorous.

By law, TMDL analyses are supposed to incorporate a margin of error to protect aquatic resources. The approach that was taken by Maine DEP in developing the Gulf Island Pond TMDL was to use what are characterized in the report as conservative assumptions to calculate the TMDL, thus providing an implicit margin of safety. However, some assumptions that are apparently derived from the underlying ecosystem models are anything but conservative.

In particular, the Phosphorus TMDL analysis incorporates a term that suggests significant removal of phosphorus from the river by unspecified processes between permitted dischargers and Gulf Island Pond. The rate of removal of phosphorus from the river was apparently estimated by fitting model parameters to match water quality and discharge data from the summer months.

However, phosphorus is an element, and is neither created nor destroyed by ecological or geological processes. Once the phosphorus enters the river, it does not simply disappear; it ends up somewhere. It is likely that the majority of the “disappearing” P will find its way into Gulf Island Pond where it is likely to exacerbate problems with algal blooms and low dissolved oxygen.

Four dominant processes are likely to account for the disappearance of the phosphorus from the water column. These are (1) uptake of P by the biota, (2) adsorption of P to sediments (3) chemical co-precipitation of P, primarily with iron and aluminum, and (4) deposition of the P in river sediments onto the floodplain during flood events. Uptake by the biota has a strong seasonal component. Thus significant P is released in the fall and winter as the biomass of aquatic plants and algae declines. Adsorption and co-precipitation of P removes P from the water column, but adds it to the sediments; rivers transport not only water, but also sediments. Again, this transport tends to have a strong seasonal component, with significant sediment transport occurring during high flow events in the spring and fall. However the P that disappeared from the water column during the summer months is still entrained in the river system, still being transported downstream. Only deposition of P-laden sediments on the river floodplain would result in removing P from the pool that will find its way to Gulf Island Pond relatively quickly.

Since Gulf Island Pond is in non-attainment only during the summer months, transport of P into the pond during the colder seasons of the year may appear to be a non-issue. Gulf Island Pond, however, is a depositional environment and is certain to act as an efficient phosphorus trap. A significant fraction of the phosphorus entering the pond will be trapped there where it is likely to enter the sediments, only to be released the

following summer when dissolved oxygen concentrations in the bottom waters of the pond decline to near zero.

It can not simply be assumed that phosphorus that disappears from the water column during the summer months is not contributing to non-attainment of water quality standards in subsequent years. Certainly any assumption that P that leaves the water column during the summer months is no longer of concern to Gulf Island Pond (as made in the draft TMDL) is not conservative, and should not be used in an analysis that purports to protect aquatic resources by relying on conservative modeling assumptions.

Issue 3: The Water Quality Standard Used in the TMDL is not supported by Statute.

I have been following the ongoing legislative battles over the shifting dissolved oxygen criteria that apply to portions of the Androscoggin River with considerable interest over the past year or so. I therefore was surprised to see the 6.5 ppm, 30 day average dissolved oxygen concentration standard used in the TMDL analysis is based on D.O. concentrations measured at or below a temperature of 22 degrees C. As I am certain you are aware, that standard is not presently in statute, and has not been approved by EPA. Moreover, it is unlikely to be protective of the narrative water quality standards, for class C waters in Maine, which require that the waters be capable of supporting trout and salmon.

Trout and salmon are highly sensitive to low dissolved oxygen. Like most poikilotherms, their metabolic demand for oxygen increases sharply with temperature. Simultaneously at higher temperatures, the concentration of oxygen in the water declines. By applying a standard that looks at dissolved oxygen only at lower temperatures the TMDL essentially turns a blind eye to precisely to those conditions most likely to be stressful to trout and salmon.

Issue 4: The TMDL does not allocate discharges

By choosing not to tackle the difficult issue of allocating discharges among the mills and other upstream permittees as part of the TMDL, DEP has all but ensured significant delay before the mills are operating on licenses protective of water quality on the Androscoggin. The draft TMDL leaves the difficult negotiations on allocation of discharges essentially to the mills. However, the mills have no incentive to find a solution quickly, and considerable incentive to delay. The longer they delay development of an allocation scheme, the longer they can continue to operate on expired licenses that are less stringent than the ones they will have to operate under after the negotiations are complete.

DEP should issue the TMDL with a preliminary, but binding, allocation of discharges among the mills. Negotiation of a permanent discharge allocation scheme, would then occur against the backdrop of an existing, enforceable set of discharge allocations. That would reverse the incentives faced by the mills, providing them with strong incentive to work out a final allocation scheme quickly.

It should also be pointed out that the idea of relying on a discharge trading scheme (which has considerable merit) does not remove the requirement for an initial allocation of discharges among the mills. Any discharge trading scheme requires two

fundamental parts: (1) a limit on the allowable discharges, and (2) clear allocation of rights to those discharges among dischargers. Without a limit, there is nothing of value to buy. But without a clear allocation of ownership of discharge rights, no one has any thing to sell.

Concluding Remarks

Once again I thank you for the opportunity to comment on the Androscoggin/Gulf Island Pond draft TMDL. The final TMDL will undoubtedly play a critical role for the foreseeable future in shaping water quality in Gulf Island Pond, as well as on the Androscoggin River both upstream and down of the pond. I very much appreciate the professionalism of your staff and the high quality of the science and modeling that underlies this important effort.

Sincerely,

Curtis C. Bohlen, PhD
Restoration Ecologist